

REMARKS

The Office Action dated July 23, 2007 has been received and carefully considered. No amendments have been made in this Response. Reconsideration of the outstanding rejections in the present application is respectfully requested based on the following remarks.

I. THE OBVIOUSNESS REJECTION OF CLAIMS

On page 2 of the Office Action, claims 1-7, 9-17, and 19-20 were rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,490,476 to Townsend et al. (“Townsend”) in view of U.S. Patent Pub. No. 2003/0161521 to Newport et al. (“Newport”), and further in view of U.S. Patent Pub. No. 2003/0190065 to Hamill et al. (“Hamill”). These rejections are hereby respectfully traversed.

Under 35 U.S.C. § 103, the Patent Office bears the burden of establishing a prima facie case of obviousness. In re Fine, 837 F.2d 1071, 1074, 5 USPQ2d 1596, 1598 (Fed. Cir. 1988). As stated in MPEP § 2143.03, to establish prima facie obviousness of a claimed invention, *all* the claim limitations must be taught or suggested by the prior art. In re Royka, 490 F.2d 981, 180 USPQ 580 (CCPA 1974). That is, “[a]ll words in a claim must be considered in judging the patentability of that claim against the prior art.” In re Wilson, 424 F.2d 1382, 165 USPQ 494, 496 (CCPA 1970).

Regarding claim 1, the Examiner acknowledges that Townsend does not disclose all the method steps as recited. In particular, the following step is admittedly not taught by Townsend:

“(d) simultaneously conducting the following steps:

*reconstructing at least a portion of a PET image for the current
frame, including the step of overlapping a portion of the
current frame with an adjacent frame, and
acquiring at least a portion of a next frame of PET data.”*

It is respectfully submitted that none of the Newport and Hamill references cure the deficiencies of Townsend.

For example, in claim 1, method step (d) requires that “*at least a portion of a next frame of PET data*” be acquired at the same time when “*at least a portion of a PET image for the current frame*” is being reconstructed. The Examiner cites paragraphs [0015]-[0016] and the Abstract of Newport as allegedly disclosing this limitation. Specifically, the Office Action states that Newport’s “parallel architecture is used to acquire and reconstruct PET images [such that] both processes are performed simultaneously.” *See* Office Action at p. 3. However, the excerpt of Newport – as relied upon by the Examiner – specifically states:

[0015] Apparatus and methods for processing continuous bed motion, three-dimensional (3D) positron emission tomography (PET) acquisitions based on a parallel/pipelined architecture are provided. As the patient bed crosses predetermined positions, specific portions of the acquired data are inserted into the processing pipeline. *At each stage* of the pipeline, a different processing step is performed on the data in parallel to the others. *One of these stages* is the conversion of the 3D data set to a two-dimensional (2D) data set. The final result of the pipeline is a single reconstructed image plane corresponding to the acquired data inserted in the pipeline at an earlier time. As the patient bed moves, new image planes are continually produced in a *periodic fashion*. At the completion of the acquisition, only the portions of the data not in the pipeline and those remaining in the pipeline have to be processed through the pipeline.

[0016] During acquisition, the emission and/or transmission events are received from an acquisition processor, along with information on the current position of the patient bed. These events are histogrammed into a 3D sinogram space based on the current patient bed position. When the patient bed *has moved a predetermined amount*, the histogramming is shifted based on this amount. With this shift, a portion of the 3D sinogram space is no longer within the histogramming region, which corresponds to the portion of the patient and patient bed that has traversed, and is no longer within, the axial field-of-view of the tomograph. This portion of the 3D sinogram space is transferred to either an attenuation processing process (for transmission data) or a normalization process (for emission data). *When normalization has been completed*, the normalized emission data is transferred to an attenuation correction process. *After attenuation correction has been completed*, the corrected data is transferred to the

Fourier Rebinning (FORE) process. The FORE process is a conversion of the data from a 3D data set to a 2D data set.

In other words, Newport's parallel architecture allows acquired data to be inserted into a processing pipeline while a bed is in motion. At best, Newport's alleged reconstruction of PET images is achieved in "stages" in a "periodic fashion" as the bed moves, and only after the bed has moved a "predetermined amount" and normalization and attenuation have been "completed" will the data be transferred for processing and/or reconstruction. This is clearly distinguishable from the recitation of claim 1, which requires **simultaneous** "*reconstructing at least a portion of a PET image for the current frame*" and "*acquiring at least a portion of a next frame of PET data.*" In fact, nowhere in Newport is "simultaneous" reconstruction and acquisition of data even disclosed. Furthermore, Newport fails to specifically teach "reconstructing at least a portion of a PET image for the current frame, *including the step of overlapping a portion of the current frame with an adjacent frame,*" as expressly recited in the claim. For example, once Newport's patient bed shifts a predetermined amount, histogramming is likewise shifted and the 3D sinogram space is no longer within the histogramming region and is no longer within the axial field-of-view of the tomograph. Thus, for at least these reasons, Newport fails to cure the deficiencies in Townsend.

Hamill also does not cure the deficiencies of Townsend or Newport. For example, the Examiner relies on paragraph [0080] of Hamill for allegedly teaching "*overlapping a portion of the current frame with an adjacent frame.*" However, Hamill does not teach or even mention overlapping a portion of the current frame with an adjacent frame. Rather, Hamill recites a "33 cm overlap between *the two bed positions*" (emphasis added). This is clearly distinguishable from the recitation of claim 1, which requires "*overlapping a portion of the current frame with an adjacent frame.*" Furthermore, Hamill fails to teach **simultaneous** "*reconstructing at least a*

portion of a PET image for the current frame” and “acquiring at least a portion of a next frame of PET data.” Therefore, like Newport, the additional timing requirement for the two sub-steps (e.g., simultaneous “*reconstructing*” and “*acquiring*”) in step (d) is also not taught in Hamill. Thus, it should be appreciated that neither Newport nor Hamill cures the deficiencies of Townsend as discussed above by disclosing simultaneous PET image reconstruction overlapping a portion of the current frame with an adjacent frame and PET data acquisition as presently claimed.

Even assuming, for the sake of argument, that Townsend, Newport, and Hamill teach all of the limitations set forth above, Applicants submit that the Office Action does not present a proper rationale to combine the references to achieve the claimed system and method, and thus has failed to set forth a *prima facie* case of obviousness. For example, Applicants respectfully submit that the allegation that one of ordinary skill in the art would have modified Townsend by the teaching of Newport and Hamill to “reduc[e] the reconstruction time for the PET data” is not proper reasoning of obviousness to support the combination of reference teachings the Examiner urges. *See, e.g.*, Office Action at p. 3.

First, Applicants respectfully submit that the Examiner improperly *assumes* the combination recited in the claim would be desired. For example, the Examiner asserts that the combination “can [be] processed or operated on at the same time” (emphasis added). *See, e.g.*, Office Action at p. 3. The PTO has the burden to establish that the prior art taken as a whole suggests the desire or advantage. Here, the Examiner himself simply assumes (not the references as whole) that it would have been obvious to one of ordinary skill in the art to create a continuous tomography bed in Townsend’s combined PET/CT system. In addition, the Examiner fails to explain *why* the art as a whole would suggest such at least a continuous

tomography bed feature or one having two bed positions specifically for a system that relies on combining PET and CT scanning. Furthermore, the assertion that a secondary reference “can” be processed or operated on at the same time does not constitute an adequate explanation to conclude an obvious combination. The inquiry is not whether, in *post hoc* fashion one reference may benefit from another – rather, the inquiry is whether there are sufficient findings based on the Graham factual inquiries to explain a conclusion of obviousness for selecting the second reference and combine it with the first in the specific manner urged by the Examiner. Thus, Applicants submits that the Examiner’s assumption is clearly improper.

Second, Applicants submits that the Examiner’s assertion of obviousness is lacking in *evidence*. Instead, the Examiner improperly relies on his own hindsight conjecture or improperly gleans from the specification that the feature of simultaneously reconstructing at least a portion of a PET image for the current frame and acquiring at least a portion of a next frame of PET data provides a “reducing the reconstruction time for the PET data.” *See, e.g.*, Office Action at page 3. For example, paragraphs [004]-[0007] of the specification disclose that this timing requirement for simultaneous PET image reconstruction and PET data acquisition is advantageous because it shortens the total effective examination time. The Examiner’s statement that Newport and Hamill would provide such a feature to Townsend’s specific method and system is wholly unsupported. In fact, such reasons for obviousness cited by the Examiner to combine the references is nowhere to be found in either the Newport, Hamill, or Townsend references. Even assuming that the reason for obviousness is applicable, Townsend makes no suggestion that it would benefit from the teachings of Newport’s continuous tomography bed and Hamill’s iterative linogram reconstruction feature. For example, Townsend is concerned with combining PET and CT scanning, whereas Newport and Hamill are primarily concerned with

continuous tomography and iterative linogram reconstruction, respectively. Therefore, the person of ordinary skill would not combine teachings from these disparate references to arrive at Applicants' invention. As a result, Applicants respectfully submit that one of ordinary skill in the art at the time of the invention would not have combined Townsend, Newport, and Hamill and that the Examiner's conclusion is clearly based on **improper hindsight** reasoning. Thus, the Examiner has failed to set forth a *prima facie* case of obviousness. For at least the reasons discussed above, the obviousness rejection for at least independent claim 1 is improper and should be withdrawn.

Regarding independent claim 11, this claim recites subject matter similar to claim 1. Thus, the arguments set forth above with respect to claim 1 are equally applicable to claim 11. Accordingly, it is respectfully submitted that claim 11 is allowable over Townsend, Newport, and Hamill for the same reasons as set forth above with respect to claim 1.

Regarding claims 2-7, 9-10, 12-17, and 19-20, these claims are dependent upon either independent claim 1 or 11. Thus, since independent claims 1 and 11 should be allowable as discussed above, claims 2-7, 9-10, 12-17, and 19-20 should also be allowable at least by virtue of their dependency on either independent claim 1 or 11. Moreover, these claims recite additional features which are not disclosed, or even suggested, by the cited references taken either alone or in combination. For example, claim 2 recites "repeating step (d) for at least one subsequent frame" and claim 5 recites "overlapping comprises computing a weight for each overlapping slice in the overlapping portion of the current frame and the adjacent frame." In this example, even though the Examiner relies on Hamill for teaching these limitations, it is respectfully submitted that Hamill's "overlap between the two bed positions" does not account for any additional subsequent bed positions to provide "at least one subsequent frame" or "computing a

weight for each overlapping slice in the overlapping portion of the current frame and the adjacent frame,” as expressly recited.

In view of the foregoing, it is respectfully requested that the aforementioned obviousness rejection of claims 1-7, 9-17, and 19-20 be withdrawn.

On page 6 of the Office Action, claims 8 and 18 were rejected under 35 U.S.C. § 103(a) as being allegedly unpatentable over Townsend in view of Newport, further in view of Hamill, and further in view of U.S. Patent No. 6,272,469 to Koritzinsky et al. (“Koritzinsky”).¹ These rejections are hereby respectfully traversed.

It is respectfully submitted that the aforementioned obviousness rejection of claims 8 and 18 have become moot in view of the deficiencies of Townsend, Newport, and Hamill as discussed above with respect to either independent claim 1 or 11. That is, claims 8 and 18 are dependent upon either independent claim 1 or 11 and thus inherently incorporate all of the limitations of either independent claim 1 or 11. Accordingly, claims 8 and 18 should be allowable over the proposed combination at least by virtue of their dependency on either independent claim 1 or 11.

Koritzinsky also does not cure the deficiencies of Townsend, Newport, and Hamill as discussed above. For example, the Examiner relies on column 1, lines 5-7 of Koritzinsky for allegedly teaching a “*method for executing protocol.*” However, Koritzinsky does not teach or even mention the additional timing requirement for the two sub-steps (e.g., simultaneous “*reconstructing*” and “*acquiring*”) in step (d). Thus, it should be appreciated that Koritzinsky

¹ Applicants note that paragraph 4 of the Office Action states that “Claims 8 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Townsend (US Patent No.: 6,490,476) in view of Hamill et al (Pub No: US 2003/0190065) further.” However, this appears to be a typographical or cut-and-paste error by the Examiner because paragraph 5 states that “Claims 8 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Townsend (US Patent No.: 6,490,476) in view of Newport et al (Pub No.: US 2003/0161521) further in view of Hamill et al (Pub No: US 2003/0190065) further in view of Koritzinsky et al (US Patent No.: 6,272,469).” Accordingly, Applicants will treat claims 8 and 18 as rejected under 35 U.S.C. § 103(a) as being allegedly unpatentable over Townsend, Newport, Hamill, and Koritzinsky.

fails to cure the deficiencies of Townsend, Newport, and Hamill as discussed above because the reference also does not disclose simultaneous PET image reconstruction overlapping a portion of the current frame with an adjacent frame and PET data acquisition as presently claimed.

In view of the foregoing, it is respectfully requested that the aforementioned obviousness rejection of claims 8 and 18 also be withdrawn.

II. CONCLUSION

In view of the foregoing, it is respectfully submitted that the present application is in condition for allowance, and an early indication of the same is courteously solicited. The Examiner is respectfully requested to contact the undersigned by telephone at the below listed telephone number, in order to expedite resolution of any issues and to expedite passage of the present application to issue, if any comments, questions, or suggestions arise in connection with the present application.

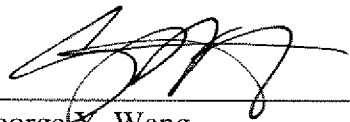
To the extent necessary, a petition for an extension of time under 37 CFR § 1.136 is hereby made.

Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account No. 50-0206, and please credit any excess fees to the same deposit account.

Respectfully submitted,

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